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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/733,675	12/11/2003	William R. Trutna JR.	1004284-1	8969

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EXAMINER

AGHDAM, FRESHTEH N

ART UNIT	PAPER NUMBER
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2611

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/733,675

Applicant(s)

TRUTNA ET AL.

Examiner

Freshteh N. Aghdam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 11-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 11-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 6/25/2007 have been fully considered but they are not persuasive.

Applicant's Argument(s): Regarding claims 1-6 and 11-19, pages 9-10, the applicant argues that the claimed invention is not taught or suggested by the combination of Sudo and Liu "Sudo uses an addition section (2) to add spread transmission signals output from the spreading section (1). Sudo then uses a serial-parallel converter (3) to divide and disassemble the added spread signals into individual chips (bits) for each spread signal, which are then frequency division multiplexed using the IFFT processing section (4). The cited language in col. 1, lines 57-64 recites that subcarriers 1 to k are assigned for bits 1 to k of transmission signals 1 to n. However, the transmission signals 1 to n have been added (by the addition section 2) and divided and disassembled (by the S/P section 3) prior to this assignment. Moreover, the assignment of subcarriers is part of the frequency division multiplexing operation. The Applicants' claimed invention allocates the same bits of the spreading codes to a respective one of the transmission channels before summing the coded signals. For example, the first bits of two different encoded information signals are inputted to an analog summer of a first transmission channel while the second bits of two different encoded information signals are input to an analog summer of a second transmission channel. The outputs of the analog summers are respective modulation signals that are used to generate respective optical transmission signals. Accordingly, for at least this

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reason, the combination of the cited language in Sudo with other references, e.g., Liu et al., does not disclose or suggest the Applicants' claimed invention. Moreover, initially, the language cited in Liu et al. as teaching the Applicants' analog summers 36-39 actually refers generally to the number of bits that can be processed over a given time frame as the summation of the bits for each subchannel, and therefore does not even refer to an adder, but rather a definition for transmission rate. Secondly, the Liu et al. reference is directed to an ASDL (asymmetric digital subscriber line) compatible modem, which is not related to decreasing amplitude differences in OFDM-CDMA systems (Sudo), and therefore likely is not even properly combinable with Sudo. Even assuming, arguendo, that these references can be properly combined, nothing in the cited language in Sudo or Liu et al., taken alone or in combination, discloses or suggests the Applicants' claimed invention. Therefore, the Applicants respectfully request that the Examiner withdraw the rejection of claims 1-2 and 11-12 under 35 U.S.C. §103(a) as being unpatentable over Sudo and further in view of Liu et al. "

Examiner's Response: Regarding the arguments set forth above, the examiner disagrees with the applicant because Sudo discloses allocating the first chips of each encoded information signal on one subcarrier to be transmitted, the second chips of each encoded information signal on another one of subcarriers to be transmitted, and so forth (Fig. 1, block 4). But Sudo does not expressly disclose the details of the signal allocation taken place in block 4 to generate the modulation signal. Therefore, the examiner combined the invention of Sudo with Liu to show that the chips

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(e.g. bits) that are allocated to the same subcarrier are in fact summed to generate the modulation signal (Par. 54).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo (US 6,839,335), further in view of Liu et al (US 2001/0007574) and Hoang et al (US 2004/0246973).

As to claim 1, Sudo discloses a method of and an apparatus for transmitting information signals via multiple transmission channels comprising: encoding each information signal with a respective spreading code to generate a coded signal corresponding to each bit of the spreading code, the spreading codes are mutually different (Fig. 1, means 1 and spreading codes 1-n; Col. 1, Lines 28-34); allocating the coded signals corresponding to the same bit of the spreading codes to a respective one of the transmission channels (Fig. 1; Col. 1, Lines 57-64); and modulating the coded signals on each channel (e.g. frequency division multiplexing; Fig. 1, means 4). Sudo is not explicit about analog summing the coded signals on each of the respective transmission channels; and generating an optical transmission signal in response to the modulation signal. Liu discloses a transmission system and/ or method, wherein the bits

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that are allocated to each transmission channel are summed (Par. 54) prior to signal transmission. One of ordinary skill in the art would recognize that the summation could be performed digitally or in analog domain, wherein the analog summer is typically smaller than its digital counterpart. Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Liu with Sudo in order to transmit a plurality of bits on each transmission channel by summing the bits to be transmitted on each transmission channel. Hoang discloses that wavelength division multiplexing is a form of frequency division multiplexing and the carrier frequencies could be replaced by carrier wavelengths (Par. 11). Therefore, it would have been obvious to one of ordinary skill in the art to transmitting first bits of plurality of encoded information signals on the same wavelength subcarrier instead of frequency subcarrier and so forth as taught by Hoang in order to rapidly convey large amount of information between two points with very low loss by utilizing an optical transmission scheme.

As to claim 2, Sudo further discloses that the spreading codes are orthogonal (Col. 1, Lines 28-34).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo Liu et al, and Hoang et al, further in view of Shattil (US 2002/0150070).

As to claim 3, Sudo and Liu teach all the subject matter claimed in claim 1, except for the spreading codes are mutually quasi-orthogonal. One of ordinary skill in the art would recognize that different types of spreading codes such as orthogonal and quasi-orthogonal spreading codes could be utilized depending on the design

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requirements, wherein each one has an advantage and a disadvantage, for example generally quasi-orthogonal codes are not preferred over orthogonal codes because of the issue of interference; in contrast, quasi-orthogonal codes are less restricted since more quasi-orthogonal codes can be generated comparing to orthogonal codes as it is evidenced by Shattil (US 2002/0150070). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Shattil with Sudo, Liu, and Hoang for the reason stated above.

Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo Liu et al, and Hoang, further in view of van der Gracht et al (US 4,835,517).

As to claims 4-5, Sudo, Liu, and Hoang teach all the subject matter claimed in claim 1, except for spreading comprises exclusive-NORing each information signal with the bits of the respective code. One of ordinary skill in the art would clearly recognize that it is well known in the art to perform multiplication utilizing either XOR or XNOR logic gates, wherein the spreading code comprises a plurality of bits as it is evidenced by van der Gracht (Col. 4, Lines 47-48). Therefore, it would have been obvious to combine the teaching of van der Gracht with Sudo, Liu, and Hoang in order to spread the information signal by multiplying the information signal by a spreading code.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo, Liu et al, and Hoang et al, further in view of Balachandran et al (US 7,187,715).

As to claims 6, Sudo, Liu, and Hoang teach all the subject matter claimed above, except for each spreading code comprises bits each in one of a first state (i.e. +1) and a second state (-1); and the encoding comprises for each bit of the spreading code in the first state, outputting the information signal as the coded signal corresponding to the bit of the spreading code; and for each bit of the spreading code in the second state, inverting the information signal and outputting the inverted information signal as the coded signal corresponding to the bit of the spreading code. One of ordinary skill in the art would recognize that it is well known in the art to spread the information signal, wherein each spreading code comprises bits each in one of a first state (i.e. +1) and a second state (-1); and the encoding comprises for each bit of the spreading code in the first state, outputting the information signal as the coded signal corresponding to the bit of the spreading code; and for each bit of the spreading code in the second state, inverting the information signal and outputting the inverted information signal as the coded signal corresponding to the bit of the spreading code as it is evidenced by Balachandran (Fig. 5, parts b and c). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Balachandran with Sudo, Liu, and Hoang in order to spread the information signal to be transmitted by multiplying each bit of the information signal with the corresponding bit of the spreading code in order to reduce power consumption in the communication system.

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo (US 6,839,335), and further in view of Liu et al (US 2001/0007574).

As to claim 11, Sudo discloses a method of and an apparatus for transmitting information signals via multiple transmission channels comprising: encoding each information signal with a respective spreading code to generate a coded signal corresponding to each bit of the spreading code, the spreading codes are mutually different (Fig. 1, means 1 and spreading codes 1-n; Col. 1, Lines 28-34); allocating the coded signals corresponding to the same bit of the spreading codes to a respective one of the transmission channels (Fig. 1; Col. 1, Lines 57-64); and modulating the coded signals on each channel (Fig. 1, means 4). Sudo is not explicit about analog summing the coded signals on each of the respective transmission channels. Liu discloses a transmission system and/ or method that the bits that are allocated to each transmission channel are summed (Par. 54) prior to signal transmission. One of ordinary skill in the art would recognize that the summation could be performed digitally or in analog domain, wherein the analog summer is typically smaller than its digital counterpart. Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Liu with Sudo in order to transmit a plurality of bits on each transmission channel by summing the bits to be transmitted on each transmission channel.

As to claim 12, Sudo further discloses that the spreading codes are orthogonal (Col. 1, Lines 28-34).

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo and Liu et al, further in view of Shattil (US 2002/0150070).

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As to claim 13, Sudo and Liu teach the entire subject matter claimed in claim 1, except for the spreading codes are mutually quasi-orthogonal. One of ordinary skill in the art would recognize that different types of spreading codes such as orthogonal and quasi-orthogonal spreading codes could be utilized depending on the design requirements, wherein each one has an advantage and a disadvantage, for example generally quasi-orthogonal codes are not preferred over orthogonal codes because of the issue of interference; in contrast, quasi-orthogonal codes are less restricted since more quasi-orthogonal codes can be generated comparing to orthogonal codes as it is evidenced by Shattil (US 2002/0150070).

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Shattil with Sudo and Liu for the reason stated above.

Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo and Liu et al, further in view of Way (US 2002/0021464).

As to claims 14-16, Sudo discloses utilizing frequency division multiplexing scheme to transmit information signals. Sudo and Liu are not explicit about the transmitter additionally comprises optical transmitter coupled to each transmission channel, wherein the output of the optical transmitters are connected to a multiplexer and the output of the multiplexer is coupled to a transmission medium that is optical fiber. Way discloses a type of frequency division multiplexing method comprising optical transmitters (Fig. 1, means 20) that are connected to a multiplexer (means 26), wherein the output of the multiplexer is coupled to a transmission medium that is optical fiber

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(means 16; Par. 3 and 27-29). Therefore, it would have been obvious to combine the teaching of Way with Sudo and Liu in order to rapidly convey large amount of information between two points with very low loss by utilizing an optical network instead (Par. 3).

Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo and Liu et al, further in view of van der Gracht et al (US 4,835,517).

As to claims 17-18, Sudo and Liu teach all the subject matter claimed in claim 1, except for spreading comprises exclusive-NORing each information signal with the bits of the respective code. One of ordinary skill in the art would clearly recognize that it is well known in the art to perform multiplication utilizing either XOR or XNOR logic gates, wherein the spreading code comprises a plurality of bits as it is evidenced by van der Gracht (Col. 4, Lines 47-48). Therefore, it would have been obvious to combine the teaching of van der Gracht with Sudo and Liu in order to spread the information signal by multiplying the information signal by a spreading code.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo and Liu et al, further in view of Balachandran et al (US 7,187,715).

As to claim 19, Sudo and Liu teach all the subject matter claimed above, except for each spreading code comprises bits each in one of a first state (i.e. +1) and a second state (-1); and the encoding comprises for each bit of the spreading code in the first state, outputting the information signal as the coded signal corresponding to the bit

of the spreading code; and for each bit of the spreading code in the second state, inverting the information signal and outputting the inverted information signal as the coded signal corresponding to the bit of the spreading code. One of ordinary skill in the art would recognize that it is well known in the art to spread the information signal, wherein each spreading code comprises bits each in one of a first state (i.e. +1) and a second state (-1); and the encoding comprises for each bit of the spreading code in the first state, outputting the information signal as the coded signal corresponding to the bit of the spreading code; and for each bit of the spreading code in the second state, inverting the information signal and outputting the inverted information signal as the coded signal corresponding to the bit of the spreading code as it is evidenced by Balachandran (Fig. 5, parts b and c). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Balachandran with Sudo and Liu in order to spread the information signal to be transmitted by multiplying each bit of the information signal with the corresponding bit of the spreading code in order to reduce power consumption in the communication system.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Freshteh N. Aghdam whose telephone number is 571-272-6037. The examiner can normally be reached on 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Freshteh Aghdam
Examiner
Art Unit 2611

August 13, 2007


CHIEH M. FAN
SUPERVISORY PATENT EXAMINER